

JALTOMATA LOJAE (SOLANACEAE): DESCRIPTION AND
FLORAL BIOLOGY OF A NEW ANDEAN SPECIES

THOMAS MIONE AND LUIS A. SERAZO

Department of Biological Sciences, Central Connecticut State University,
New Britain, CT 06050-4010

ABSTRACT. *Jaltomata lojae* (Solanaceae) of southern Ecuador and northern Peru is described. This species is distinguished by the following features: finger hairs borne by the leaves and stems; a white, broadly infundibular to rotate corolla; exerted stigma; a broad nectary disk; and orange fruits. Corollas change from pale green to white at anthesis. Flowers are self-compatible, herkogamous, and sometimes protogynous. Microscopic, densely staining, multicellular glands that may be osmophores are located on the perianth. Berries are eaten by humans.

Key Words: edible fruit, floral biology, herkogamy, *Jaltomata*, osmophore, Solanaceae

Jaltomata includes about 40 neotropical herbaceous and shrubby species distributed from Arizona, U.S.A., to Bolivia, as well as on the Galápagos Islands and the Greater Antilles (Mione et al. 1993). The fruits of most species are eaten uncooked (Davis and Bye 1982; Mione 1992). This description of a new species is a contribution to ongoing systematic studies of this genus (Mione 1999; Mione and Bye 1996; Mione and Leiva 1997).

MATERIALS AND METHODS

The description is based on the holotype and plants grown, from seed of the type collection, in the University of Connecticut (UConn) and Central Connecticut State University (CCSU) greenhouses. To look for structures that may release scent (osmophores), flowers were stained in 0.01% neutral red for several hours and then observed with bright field microscopy (Kearns and Inouye 1993). Observations on floral phenology were made in May of 1992 at UConn, and March to May of 1998 at CCSU. Chromosome counts were made with meiocytes of immature anthers stained with acetic carmine. Floral fragrance was evaluated by seven people who were blindfolded and asked to describe the fragrance of an empty jar and then a jar containing flowers. Jars were uncapped seconds before being placed in close proximity to

the nose. To examine seed set, flowers were manually pollinated during the pistillate and hermaphroditic phases. Undehisced anthers were removed at the time of pollination.

TAXONOMIC TREATMENT AND DISTRIBUTION

Jaltomata lojæ Mione, *sp. nov.* TYPE: ECUADOR. Prov. Loja: by guard station on the E side of Celica, 1950 m, growing along roadside, 2 May 1991, *D. M. Spooner, R. Castillo, and L. López 5037* (HOLOTYPE: CONN). Figures 1 and 2.

A *J. cajamarca* Mione atque *J. sagasteguii* Mione foliis pilis dactyliformibus, corolla sub anthesi rotata et ovarii disco lato differt.

Perennial shrub; branches and leaves densely villous, bearing finger hairs, these sometimes gland-tipped, 0.15–6 mm long, becoming less villous with age. Leaves alternate, often geminate, ovate, to 15 cm long \times 6 cm wide, the margin entire to sinuate-dentate, undulate, the petiole to 4.5 cm long. Inflorescence umbelliform, to 9-flowered. Peduncle 5–9 mm long (at flowering), pedicel 8–11 mm long (at flowering), both having a dense covering of erect finger hairs to 1.5 mm long, some hairs gland-tipped. Calyx (at flowering) light green, 9.5 mm in diameter, strongly reflexed, abaxially villous with gland-tipped finger hairs, forked hairs, and dendritic hairs all 1–2 mm long, and abaxially and adaxially with stalked multicellular glands 62–80 μ m long (Figure 2), at fruit maturity calyx diameter to 12 mm. Corolla infundibular when partially open, rotate when fully open, white, with two green proximally positioned maculae straddling the radial vein to each corolla lobe (Figure 1), 5 prominent lobes alternating with 5 small lobules, 25–27 mm in diameter on plants we grew, 18 mm in diameter on the holotype, adaxially glabrous, abaxially with sparsely but evenly distributed stalked multicellular glands 62–80 μ m long (Figure 2). Two classes of hairs extend out from the corolla margin: marginal hairs to 110 μ m long, and submarginal (attached abaxially) hairs to 0.5 mm long. Stamens 5, 5 mm long; filaments on living plants angling away from style and slightly curved outward, villous on basal 1/4 of the length with unpigmented finger hairs to 1.2 mm long; anthers 2.1–2.5 mm long prior to dehiscing, 1.6–1.8 mm long after dehiscing, when corolla is fully open exerted out of corolla 2 mm,



Figure 1. *Jaltomata lojae*. Inflorescence on plant grown from seed of the type collection. Units are millimeters.

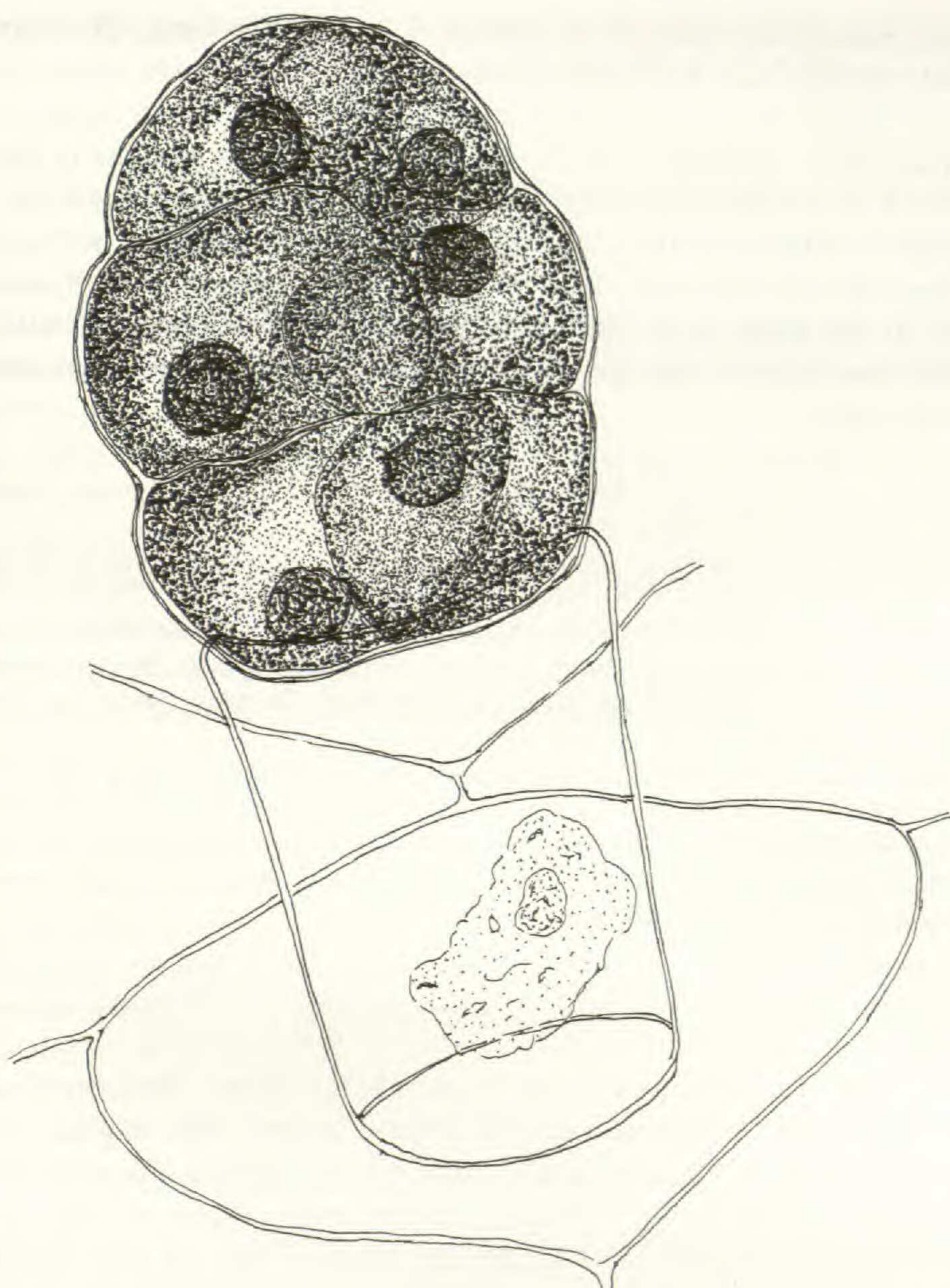


Figure 2. Perianth gland (75 μm long). Multicellular head stains deeply with neutral red, the stalk cell does not. Drawn by L. A. S. from plant grown from seed of the type collection.

otherwise included. Pollen grains 32.5 μm average diameter ($n = 22$ grains). Ovarian nectar disk orange (visible by eye on living flowers). Style 9–11 mm long, slender and straight (Figure 1), exerted 3–8 mm beyond the anthers; stigma shallowly bilobed, 0.4 to 0.75 mm wide on pressed specimens, broader than the style (Figure 1), the papillae 30–60 μm long. Mature fruits orange.

Seeds numerous, ovate to reniform, 1.3–1.6 mm long. Chromosome number $n = 12$ (nine counts).

DISTRIBUTION, ECOLOGY, LOCAL NAMES, USES. This species is distributed in southern Ecuador and northern Peru in disturbed habitats from 1900 to 2700 m elevation. Its local names are “ubillos” (*Ellemann 66799*) and “uvilla” (*van den Eynden and Cueva 342*). It has been used “for sunburn, used with alcohol for bath” (*Ellemann 66799*) and the fruits are edible (*van den Eynden and Cueva 342*).

OTHER SPECIMENS EXAMINED: specimens made from plants grown from seeds of the type collection *Mione 560* (CONN, HAO, MO, NY, QCA).

Ecuador. PROV. CHIMBORAZO: Cañon on the Río Chanchan, directly above the village of Huigra, 29–31 May 1945, *Camp E-3498* (NY); PROV. LOJA: Lugma Huycu 12 km north of Saraguro, 19 Jan 1989, *Ellemann 66799* (AAU not seen, NY); Cerro Sozoranga, Colaisaca-Utuana, km 0.5, 24 Apr 1994, *Jørgensen et al. 567* (MO not seen, NY); Sevilán, 26 Mar 1995, *van den Eynden and Cueva 342* (LOJA not seen, NY).

Peru. Dept. PIURA, PROV. Huancabamba: Abra de Porculla, entre Olmos y Jaén, ladera con monte bajo, 22 Apr 1964, *Ferreyra 15667* (K, US); Carretera entre Canchaque y Huancabamba, km del 16 al 25 desde Canchaque, 17 Apr 1987, *Díaz and Baldeón 2395* (MO, NY); Perculla, 2 May 1981, *Llatas and Laes 631* (HUT not seen, MO, NY).

FLORAL BIOLOGY

To look for structures that may release scent, flowers were stained in dilute neutral red for several hours. The stigma (including papillae) stained darkly with neutral red but the style did not. Anthers and pollen stained darkly while filaments did not. Multicellular glands, located on the abaxial face of the corolla and both faces of the calyx, stained darkly, except for the stalk cell (Figure 2). Similar glands have been described on the leaves of *Solanum* (Seithe 1979) and *Physalis* (Seithe and Sullivan 1990). Neither the corolla margin hairs nor the hairs of the filaments absorbed stain. On the multicellular finger hairs only the glandular tip, when present, absorbed stain. Hand-sections of epidermal tissue of the ovary disk, stained and then observed with a compound microscope, revealed that the nectary disk absorbs stain only in the immediate vicinity of the stomata. The guard cells stained deeply, and the cells surrounding the guard cells also absorbed stain but staining was less intense. Flowers produced a

subtle fragrance that was described as licorice-like, vanilla-like, or faintly sweet by the seven people polled and the authors. (Two of these people also detected a fragrance in the empty/control jar.)

Flowers remained open 5 to 7 days (mean 5.7 days, $n = 9$ flowers) and closed each night. Within an inflorescence one to four flowers were open at a time. The corolla was pale green prior to anthesis but after the corolla opened for the first time it became white and remained white. The anthers of a flower either dehisced a few at a time over the course of several hours, or two or three of the anthers dehisced one day and the others dehisced the next day. Anthers dehisced prior to 8:30 am. Some flowers exhibited one day of protogyny, with the stigma protruding through the partially open corolla. Two out of three flowers manually pollinated during the pistillate phase set seed, as did many (percentage not calculated) of the flowers that were manually pollinated during the hermaphroditic phase. In the greenhouse, plants did not set fruit unless hand-pollinated. This is likely due to herkogamy: the stigma is located 3 to 8 mm from the anthers. Nectar drops at the base of the corolla (alternating with the stamens) were large enough to be observed by eye. The broad, orange ovary disk is concentric around the green ovary and increases the diameter of the ovary by 1 to 1.5 mm over what the ovary diameter would be without the disk. Nectar seemed to be secreted by the ovarian disk but may also be secreted by the base of the corolla.

ACKNOWLEDGMENTS. We thank David M. Spooner for seeds and review of the manuscript, Clinton E. Morse for care of living plants, Kancheepuram N. Gandhi for Latin translation, and Janet R. Sullivan and Gregory J. Anderson for review.

LITERATURE CITED

- DAVIS, T. IV AND R. A. BYE, JR. 1982. Ethnobotany and progressive domestication of *Jaltomata* (Solanaceae) in Mexico and Central America. *Econ. Bot.* 36: 225–241.
- KEARNS, C. A. AND D. W. INOUE. 1993. *Techniques for Pollination Biologists*. University Press of Colorado, Niwot, CO.
- MIONE, T. 1992. The systematics and evolution of *Jaltomata* (Solanaceae). Ph.D. dissertation, Univ. Connecticut, Storrs, CT.

- . 1999. *Jaltomata* II: New combinations for five South American species (Solanaceae). *Brittonia* 51: 31–33.
- , G. J. ANDERSON, AND M. NEE. 1993. *Jaltomata* I: Circumscription, description and new combinations for five South American species. *Brittonia* 45: 138–145.
- AND R. BYE, JR. 1996. *Jaltomata chihuahuensis* (Solanaceae): A new combination and observations on ecology and ethnobotany. *Novon* 6: 78–81.
- AND S. LEIVA G. 1997. A new Peruvian species of *Jaltomata* (Solanaceae) with blood-red floral nectar. *Rhodora* 99: 283–286.
- SEITHE, A. 1979. Hair types as taxonomic characters in *Solanum*, pp. 307–319. *In*: J. G. Hawkes, R. N. Lester, and A. D. Skelding, eds., *The Biology and Taxonomy of the Solanaceae*. Linnean Society Symposium Series No. 7. Academic Press, New York.
- AND J. R. SULLIVAN. 1990. Hair morphology and systematics of *Physalis* (Solanaceae). *Pl. Syst. Evol.* 170: 190–204.